

REMARKS

The Office Action mailed January 15, 2004 has been reviewed and carefully considered. Claims 3, 4, 6, 7, 9-11 remain pending in this application, with claims 3 and 4 being independent claims. Consideration of the above-identified application, as amended, and in view of the following remarks is respectfully requested.

On a preliminary note, the Examiner required new corrected drawings, correcting certain margin requirements. Corrected drawings have been mailed on 03/24/2004.

In the present Office Action, the Examiner rejected claims 3, 4, 9, 11 and 12 as anticipated under 35 U.S.C. §102(a) over Gries, Zangler or Pelouch. Further, the Examiner rejected claims 6, 7 and 10 as being obvious over the same references, individually considered.

Concerning the anticipation rejection, applicants respectfully submit that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described; in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Briefly, the present invention relates to predetermining the beam path direction, i.e., there exists one beam path direction (e.g., 0°) where most degradation occurs and a second beam path direction (e.g., 180°) where degradation is at a minimum. The invention claims an arrangement in which the minimum of degradation occurs when, before arranging the crystal, the preferred beam path direction is determined. Only with the knowledge of such preferred beam path direction, can the crystal be arranged correctly.

Applicants respectfully submit that the cited references differ from applicants claimed invention. Gries describes a laser arrangement for the dispersion-free tuning of the length of a passive resonator wherein at least two elements of optical transparent materials are combined to compensate dispersion. The arrangement of Gries differs from the laser apparatus of the present invention in that the conversion crystal of Gries is not positioned such that the radiation enters in a predetermined or selected direction. In Gries, the radiation enters in a specific direction relative to the ring cavity, but not exclusively in the predetermined/selected direction inside the non-linear crystal which leads to a lower degradation. The Examiner state that Gries would show such features in Fig. 1, however, no reference to any descript is given. Nowhere does Gries state that

the crystal is to be arranged in a predetermined direction relative to the preferred path direction inside the non-linear crystal. In contrast to Gries, these features are only disclosed and claimed in the present invention. The independent claim 3, for example, claims "(a) selecting a preferred beam path direction of a frequency conversion crystal by arranging a crystal in one of two directions for frequency conversion, the directions being related by 180°, and the beam path direction being selected according to lower degradation compared to the other beam path direction". Similarly, claim 4 claims "a unidirectional ring cavity comprising a frequency conversion crystal, a prism and mirror arrangement, wherein the frequency conversion crystal is positioned such that the radiation produced by the optical pumping source enters "in a direction such that the crystal is passed by radiation only in one selected beam path direction."

The second alternative reference cited by the Examiner, Pelouch describes a laser arrangement having a ring cavity wherein the pumping of crystal 12 produces a continuous-wave output in clockwise and counterclockwise directions within the ring cavity, independent of cavity alignment. Coupling one of the two decoupled laser beams via the output coupler 30 into the external cavity 36 leads to mode locked operation in direction of the output beam 32. There is no disclosure concerning a preferred or selected direction of the laser crystal relative to any direction, neither clockwise nor counterclockwise. As shown above in the discussion of Gries, applicants' independent claim 3 requires "predetermining the beam path direction of the frequency conversion crystal such that said the crystal is passed by the radiation only in a predetermined beam path direction." And, similarly, claim 4 claims a "unidirectional ring cavity comprising a frequency conversion crystal, a prism and mirror arrangement, wherein the frequency conversion crystal is positioned such that the radiation produced by the optical pumping source enters in a direction such that the crystal is passed by radiation only in one selected beam path direction." The arrangement of Pelouch differs from the laser apparatus of the present invention in that the conversion crystal is not positioned such that the radiation enters in a predetermined direction while the crystal 12 is struck from both sides. There is also no disclosure concerning different performance of the laser by rotating the crystal 12 by 180° around an axis vertical to the plain of the ring cavity.

Therefore, Pelouch does not anticipate applicants' claims.

The third cited reference, Zanger, describes a laser arrangement wherein the non-linear crystal NK is rotated by a few degrees to achieve phase matching and to increase the tunability over a broad wavelength range. The rotation of the non linear crystal is only for a few degrees (e.g. $<10^\circ$ as disclosed in figure 5, 6 and 7) with an axis of rotation which is in the plain of the ring cavity. In contrast, the present invention requires determining/selecting the direction of the non linear crystal with a predetermined direction of the crystal relative to the unidirectional beam path. A rotation of 180° around an axis perpendicular to the plain of the ring cavity allows the selection of the "right" orientation of the crystal relative to the direction of the beam path, which is determined by the ring cavity.

Zanger provides no disclosure concerning the selection of the non-linear crystal to be operated in a preferred direction relative to the beam path (forward 0° , or backward 180°). Accordingly, Zanger does not anticipate applicants' invention as claimed.

Concerning the obviousness rejections of claims 6, 7 and 10, applicants submit that such claims are not obvious over Gries, Zanger or Pelouch, simply because such dependent claims add elements that might also be utilized by the references in a different environment.

The differences between the subject matter of the present invention and the prior art are such that the subject matter as a whole is not obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Accordingly, the claims are not obvious. More specifically, without a (pre-)determination of the preferred beam path direction the crystal will be arbitrarily arranged by one skilled in the art, possibly randomly, possibly in the preferred beam path direction.

For the foregoing reasons, applicants respectfully traverse the Examiner's prior art rejection and request that the rejection under 35 U.S.C. §102 and 103 be withdrawn.

Applicants submit that the application is now in condition for allowance and passage to issuance is requested.

Applicant respectfully requests that the Examiner call the undersigned attorney if he has any further questions or amendments that may be handled telephonically.

If any additional fees or charges are required at this time in connection with the application, authorization is hereby given to charge our Patent and Trademark Office Deposit Account No. 14-1263.

Respectfully submitted,



Christa Hildebrand

Reg. No. 34,953

Attorney for Applicants

Norris McLaughlin & Marcus P.C.
220 East 42nd Street, 30th Floor
New York, N.Y. 10017
Telephone: (212)808-0700
Facsimile: (212)808-0844